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ABSTRACT

The study reported in this paper intended to trace what Chinese children think about life and identify their naive theories. Fifty-eight 5-year-old children in Taiwan from 39 kindergartens were interviewed using a semi-structured instrument. Results indicate that preschool children have preconceptions about the concept of life even before entering elementary school. Some naive theories expressed by the students include movement theory, function theory, growth theory, organ theory, response theory, action theory, death theory, life-span theory, and myth theory. Most of the young children had developed conceptions of life concerning primary attributes such as movement, growth, reproduction, structure, and Function. Most of them had not developed the advanced attributes such as responsiveness, adaptation, life organization, energy translation and so forth. Contains 13 references and a list of 6 papers in Chinese. (Author/JRH)

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CHINESE YOUNG CHILDREN'S CONCEPTIONS OF 'LIFE'

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CHINESE YOUNG CHILDREN'S CONCEPTIONS OF LIFE

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ABSTRACT

The questions "What is nature ?" and "what is life?" are commonly encountered by children. The purpose of this study is to identify the Chinese young children's conceptions of "life." Fifty-eight 5-year-old children from 39 kindergartens in the northern Taiwan area participated in this study. Each child was interviewed by a trained interviewer using semi-constructed instrument.

The results were obtained from three alternatives: (1) descriptive statistics, (2) naive theories, and (3) individual response patterns.

This is a pioneer study focused on the alternative framework among the Chinese **preschool** children in Taiwan. The results of this study can be provided as a reference for cross-culture and cross-age studies as well as for curriculum writers and teachers.

Key Words: Children's science, Elementary, Life, Interview

INTRODUCTION

A 5-year-old child asked me "Is house a living thing?

House is getting old, see,. . . . we often say : this is an old house . . . . "

Children hold their own conceptions of the world. Without any further explanations, Chinese parents and teachers might simply answer the above question with "No, a house is not a living thing." Recently, more and more of Chinese parents and teachers realized that children are scientists with their own views to explain the world around. Our parents and teachers should pay more attention to the little ones have about what they see and hear the ideas.

This study intends to trace what Chinese young children think about life and identify what naive theories children have developed. It is also aimed at helping teachers to find what ideas of children's conceptions of life. Accordingly, teachers could try to improve their teaching strategies. The various conception frames may be due to different cultures. The results can also be provided as a reference for cross-culture and cross-age studies as well as for program writers. After having been used in Taiwan Standard Science Textbooks standing for half of the century, National elementary science curriculum will soon be discontinued. Science curriculum programs will be written and published by private institutes instead of the government Educational Bureau. Therefore, science concept learning becomes one of the most urgent research issues in Taiwan for writers of curriculum programs. They used to collect data for thieir research that are of domestic origins rether than of foreign studies.

In the past two decade, science educators have conducted researches on misconceptions (Driver & Easley, 1978; Helm & Novak, 1983), alternative conceptions (Head, 1986), children's science (Gilbert, Osborne, & Fensham, 1982; Fisher & Lipson, 1986) and preconceptions (Clement, Brown, & Zietsman, 1989). Some of them dealt with the conceptions of living things (Bell, 1981a, 1981b; Brumby, 1982; Stepan, 1985; Trowbridge & Mintzes, 1985). In Taiwan, studies on students' alternative conceptions

have been encouraged and have become one of the most significant research issue for the past few years (Cheng, 1994; Chiu, et. al, 1993; Huang & Huang, 1987; Hsiung, 1992; Huang, 1994; Dai, 1994). Many research studies have indicated that students develop intelligently their own concepts of science, even though some of them are misconceptions.

The positivism paradigm emphasizes that experience is the only way to attain knowledge for children, therefore, perception is a major approach to acquire the knowledge. According to constructivism, children synthesize the similar attributes into a concept which is called a scheme. Children construct and reconstruct their beginning schemes and terminal schemes into a new cognitive frame. The new knowledge,in turn, is build up in one's mind. Preschool children firstly view the world through their concrete operations, i.e., experience, they subsequently go to construct schemes. Positivism and constructivism are the two major reciprocal rationales for this study.

In the United States, Stepans (1985) interviewed 30 5th graders, and results showed that most of the children investigated used "action" as a criterion to identify living things. Some students identified the inanimate objects as non-living things because they lack of organs and functions. In Israel, Bar-Yoseph and Lazarowitz (1992) studied students' conceptual development of life. The results he gained showed that "movement" was the most commonly used attribute of life for animal and inanimates, and "growth" was the most commonly used attribute of life for plants. Stavy and Wax (1992) stated that 40 % of the 6th graders in Israel considered plants as non-living things, and that 100% of sampled Japanese young children considered plants as living things. In Taiwan, Huang (1993) interviewed elementary students, aged 6-12, having them diagnose their alternative frameworks on the conceptions of life. He concluded that the elementary school pupils did not hold the advanced criteria, i.e., variation, adaption, homeostasis balance their conceptions of life.

METHODS

Fifty-eight 5-year-old children from 39 kindergartens in the northern Taiwan area were selected and sampled. Each of them was individually interviewed on the subjects as follows: (1) Plants: Why do you think a tree is (not) a living thing? Is a piece of wooden furniture alive? Yes, why, no, why not? (2) Animals: Why pets are living things? The purpose of this question was to examine what are the criteria children used to identify a living animal. (3) Plants, animals and non-living things in the same environment: Are the containings in an aquarium such as gold fish, stones, weeds are alive? What are the differences between these three objects in an aquarium. Ask the children to compare the "foods" of animals and plants. (4) Humans: Why human beings are living things? Try to collect more comprehensive understandings about life from the children. (5) Also ask children to give examples for things alive besides animals and plants, and to provide the reasons. Follow-up questions were asked on each question, so that the children's conceptions can be fully probed into.

All interviews were tape-recorded. The transcribed data were analyzed in three approaches: (A) Calculating percentages of identifying living things and non-living things. To do this, the responses to the objects (dogs, fish, trees, aquatic weeds, airplanes, rocks) were coded for descriptive statistics calculation. (B) Categorizing all attributes of "life" that children's answers contained into 8 groups, and frequencies of all attributes were coded from their responses. Summarizing the frequency and dividing these 8 theories into 3 categories, the most to the least frequency. (C) Identifying response patterns of individual interviewees.

FINDINGS

(A) Descriptive Statistics

There were 58 five-year-old children interviewed. The percentages of the children identifying the living and non-living things are showed in the Fig 1.

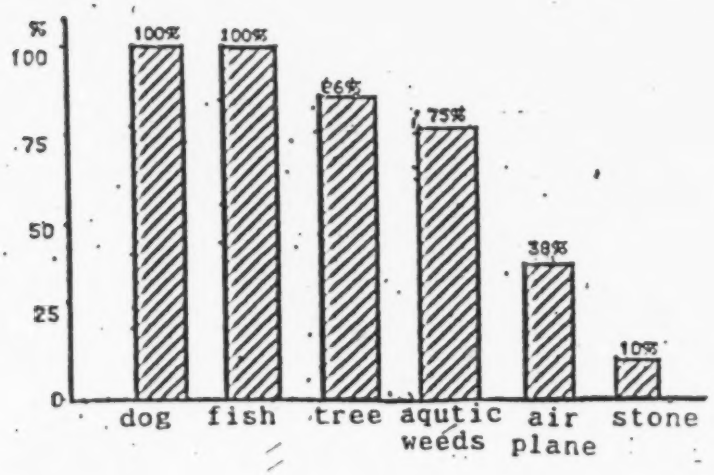

Fig.1 Percentages of the Children identifying the Living and Non-living Things

The results have showed that 100% of sampled children considered animals as living things, and relatively lower percentage of the children considered that plants are not living things. Surprisingly, 10% of sampled children considered that some kinds of rocks are alive. This may be due to Chinese legends and folk tales, especially from Kon-Fu pictures that deal with living stones. Some of them did not offer any reason.

(B) Children's Naive Theories of Life

(1) *Three major theories*

(a) Movement theory: Most of the children classified the living things by the attributes of movements. The children's answers are exampled as follows:

Tree is dead.....it won't move.

Aquatic weed is dead for it can't move.

Dog can run.

Air plane is alive because it can move.

When the muppy doll is put away, she is dead, she turns to alive when people hold her up.

The volcano is alive because it blows off.....Volcanoes in Taiwan are all dead.

River goes,.....water flows in it.

(b) Function theory: Very often the children responded that the living things have some functions. The children's answers are exampled as follows:

Trees drink water all day long.

Tree eats sunlight and air.

Trees are alive for they can breathe. Wooden tables can't breathe, it 's dead.

Trees eat nitrations with their roots.

Flowers use their pistils to breathe.

Stone can't eat.

Man works. Man can think.

Man can do anything he wants.

(c) Growth theory: Growth is a slow yet moving phenomena. The young children had often heard "You are growing up!" from adults. Children also are surrounded by things that grow. Children are easily to experience this attribute. For example, a child said: "Yes,.....Because trees grow up." "I grow up." "Table doesn't grow bigger." "Stone doesn't grow !" Most of the children who answered that plants are living things used this attribute for justification.

(2) ***Two minor theories***

(a) Organ theory: Some children defined the living things by having organs. For example:

Trees are alive because they have "skin" as we do.

Tree and flower both have mouths, invisible!

Grass has no legs, no eyes. It's dead, surely!

Dog has heart .

Doggy has 4 legs.

A dead man has no heart..... bones only!

(b) Reproduction theory: Reproduction was considered as an attribute for living things by some children. For example: "Dog can have a baby doggy." " I was born by my mom." "A tree has seeds which will bud into young trees." "Anything can be planted must be living things."

(3) ***Three micro theories***: The attributes of life span, metabolism and response are also the characteristics of living things. But not many children considered them. The frequencies of answers on these attributes were lower than those of major attributes.

(a) Life span. Some of the children said: "Trees get old and die, and fall down." "Tree has annual rings." "We get old, . . . If a man gets very very old, then he dies." "People count the sun's age."

(b) Metabolism theory: The children have the following observations: "Doggy needs to eat." "We need to go PiPi." "People sometimes feel hungry." "After shining on the earth all day, the sun gets tired, he needs to rest. So the sun is alive."

(c) Response theory: A few children noted that living things can response to the environment : "If dog is attacked, he barks." "Stone must stay in land; if it stays in water , it dies." "Monkey hides himself behind a tree if you yell at him." However, no one indicated plant can response to the light.

(C) Individual response pattern

From interviews, it was found that some children expressed their conceptions in a consistency of using the same explanations, i.e., they employed one naive theory for most of the questions. There were 9 patterns for individual interviewee who responded to many questions with the same theory.

Action theory: Things that act are living things. For example, interviewee

No.39 used action theory to explain fish, dog, ship, man, airplane, river, volcano, electric fan, bike, clouds, puppy are all alive because they can move. And aquatic weeds, stone, dead man, tree, still flower, puppy on table are all dead because they do not move.

Intact theory: This theory was used as the criteria for identifying live or dead objects. For example, interviewee No.17 identified the airplane, the sun, bike, tree, man, ship and faucet are all alive because: "Airplane was not crashed." "The sun has not shot off." "Bike keeps alive before breaking." "If paper box is torn up.....then dead." "Water running in faucet , it's alive."

Cultivating and planting theory: Interviewee No.33 said that objects or things which were cultivated, planted or born are living things. For example: "Trees can be planted, they are living things. "Things we feed must be living things.....like fish."

Growth theory: Interviewee No.55 insisted that the attribute of growth is necessary for defining a living thing. For example: "Table is dead stuff because it doesn't grow." "Fish can grow." "..... If we die we do not grow any more." "River does not grow." "Blanket does not grow."

Organ theory: Interviewee No.16 mostly considered organ the attribute for a living thing. "Grass has no mouth." "Bicycle is not a living thing because it has no eye, no nose." "Stone....., no mouth." "Cat? Yes, she has four legs."

Death theory: Interviewee No.44 who considered death the most important attribute for a living thing. He said: "Tree will die;" "Fish will die;" "Dog will die;" "Man die if killed."

Eatable theory: Interviewee No.21 defined living things as eatable objects or what thing needs to eat. For example: "Table is not a living thing because it is not eatable." "Weeds and stones are not living things because they are not eatable." "Tree eats water; it's alive." "River drinks plenty of water."

Myth theory: Interviewee No.51 thought that some things were alive because a fairy or ghost was in them. He said," Fairy talked to a rock, rock talked to fairy too."

"River is alive because .....God of River turned herself into a river."

Non-human theory: A student (No.12) compared things with human. "Tree is not a living thing because it is not a man." "Table is not a man either."

CONCLUSIONS AND DISCUSSIONS

The statistics have shown that none of the preschool children thought that animals were non-living things. Although 10% of the children believed that a stone was alive, yet their reasons were vague. "Movement" is the most popular attribute for identifying a living thing. There were more children who agreed that a territory plant is a living thing than those who agreed that an aquatic plant is a living thing. In children's world, animals sound more like living things than plants.

The naive theories are summarized in order of frequency: movement theory, function theory, growth theory ,organ theory, reproduction theory, life-span theory, metabolism theory, and response theory. In all nations of the world, children have UNIVERSAL naive theories. It is found that some children expressed their conceptions in a consistency of using the same theory for most of the questions. These theories are action theory, growth theory, organ theory, eatable theory, cultivating and planting theory, death theory, myth theory, non-human theory, intact theory.

Interestingly, the children used more and correct attributes for identifying "man" as a living thing while the children used less correct attributes for identifying "animal", and used less and incorrect attributes for identifying "plant" as a living thing. The results of this study have shown that the preschool children constructed their preconceptions of life before entering elementary school. Children observe nature's phenomena from the time they are born. They use their own language to describe their observations. From the view of constructivism, children construct sound plausible explanations for themselves. However, their explanations about living things are not the same as a biologist's views.

Most of the young children interviewed had developed conceptions of life concerning the primary attributes, such as movement, growth, reproduction, structure

and function. Most of them had not developed the advanced attributes, such as responsiveness, adaption, life organization, energy translation and so forth. The young children are ego-centered naive scientists. They view nature in part instead of as a whole.

Science naive theories may interfere with future learning. Teachers should understand children's understandings about the world and provide an appropriate learning environment for young children to explore, to observe, to construct their frameworks, so that their preconception would be changed.

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